

EXHIBIT Q

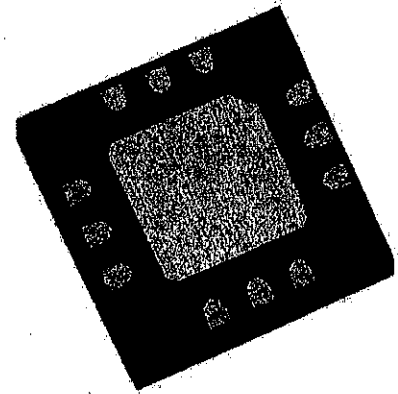
HRF-SW1000

Honeywell

SPDT Absorptive RF Switch DC To 4GHz Operation

The Honeywell HRF-SW1000 is a high performance single pole double throw (SPDT) absorptive RF switch that is ideal for use in wireless basestation and handset applications that require minimum power and minimum insertion loss.

The HRF-SW1000 is manufactured with Honeywell's patented Silicon On Insulator (SOI) CMOS technology, which provides the performance of GaAs with the economy and integration capabilities of conventional CMOS technology. These switches are DC coupled to improve lower operating frequency, frequency response and reduce the number of DC bias points required.



HRF-SW1000 in VQFN Package

FEATURES

- Typical High Isolation Of > 42 dB @ 2 GHz
- Typical Low Insertion Loss Of 1.2dB @ 2 GHz
- Integrated CMOS Control Logic
- DC-coupled, bi-directional RF Path
- Single Positive Supply Voltage
- Ultra Small VQFN Packaging
- Impedance matched for 50 Ohm systems

RF ELECTRICAL SPECIFICATIONS @ + 25°C

Results @ $V_{DD} = 5.0 \pm 10\%$, $V_{SS} = 0$ unless otherwise stated, $Z_0 = 50$ Ohms
Contact Honeywell for relative performance at other supply configurations

| Parameter | Test Condition | Frequency | Minimum | Typical | Maximum | Units |
|---------------------------|---|-----------|---------|---------|---------|-------|
| Insertion Loss | | 0.5 GHz | | 0.9 | 1.4 | dB |
| | | 2.0 GHz | | 1.2 | 1.6 | dB |
| | | 3.0 GHz | | 1.7 | 2.2 | dB |
| Isolation | | 0.5 GHz | 52 | 55 | | dB |
| | | 2.0 GHz | 42 | 45 | | dB |
| | | 3.0 GHz | 36 | 41 | | dB |
| Return Loss | | | -15 | -20 | | dB |
| Input P1dB | $V_{SS} = \text{Gnd}$ $V_{SS} = -5V$ | 1.0 GHz | | 17 | | dBm |
| | | 1.0 GHz | | 27 | | dBm |
| Input IP3 | Two-Tone Inputs, up to + 5 dBm $V_{SS} = \text{Gnd}$ $V_{SS} = -5V$ | 2.0 GHz | | 35 | | dBm |
| | | 2.0 GHz | | 37 | | dBm |
| Trise, Tfall Ton, Toff | 10% To 90% 50% Cntl To 90% / 10%RF | | | 10 | | ns |
| | | | | 20 | | ns |

HRF-SW1000**DC ELECTRICAL SPECIFICATIONS @ + 25°C**

| Parameter | Minimum | Typical | Maximum | Units |
|-----------------------|-----------------------|---------|-----------------|-------|
| V _{DD} | 3.3 ¹ | 5.0 | 5.5 | V |
| V _{SS} | -5.0 | | | V |
| I _{DD} | | <5 | 35 | uA |
| CMOS Logic Level (0) | 0 | | 0.8 | V |
| CMOS Logic Level (1) | V _{DD} - 0.8 | | V _{DD} | V |
| Input Leakage Current | | | 10 | uA |

Note 1, the performance curves are for V_{DD} = +5.0 +/- 10%

ABSOLUTE MAXIMUM RATINGS¹

| Parameter | Absolute Maximum | Units |
|---------------------------------|-----------------------|-------|
| V _{DD} | +6.0 | V |
| V _{SS} | -5.5 | V |
| V _{in} Digital Logic 0 | -0.6 | V |
| V _{in} Digital Logic 1 | V _{DD} + 0.6 | V |
| Input Power | > 35 | dBm |
| ESD Voltage ² | 400 | V |
| Moisture Sensitivity Level | Level 3 @ 240 °C | |
| Solder Reflow Temperature | 250 | °C |
| Operating Temperature Range | -40 to +85 | °C |
| Storage Temperature Range | -65 to +125 | °C |

Note 1 - Operation of this device beyond any of these parameters may cause permanent damage.

Note 2 - Although the HRF-SW1000 contains ESD protection circuitry on all digital inputs, precautions should be taken to ensure that the Absolute Maximum Ratings are not exceeded.

Latch-Up: Unlike conventional CMOS digital attenuators, Honeywell's HRF-SW1000 is immune to latch-up.

TRUTH TABLE

| Switch Control | RF Output 1 | RF Output 2 |
|----------------|-------------|-------------|
| 0 | RF INPUT | |
| 1 | | RF INPUT |

"0" = CMOS Low, "1" = CMOS High

PIN CONFIGURATIONS

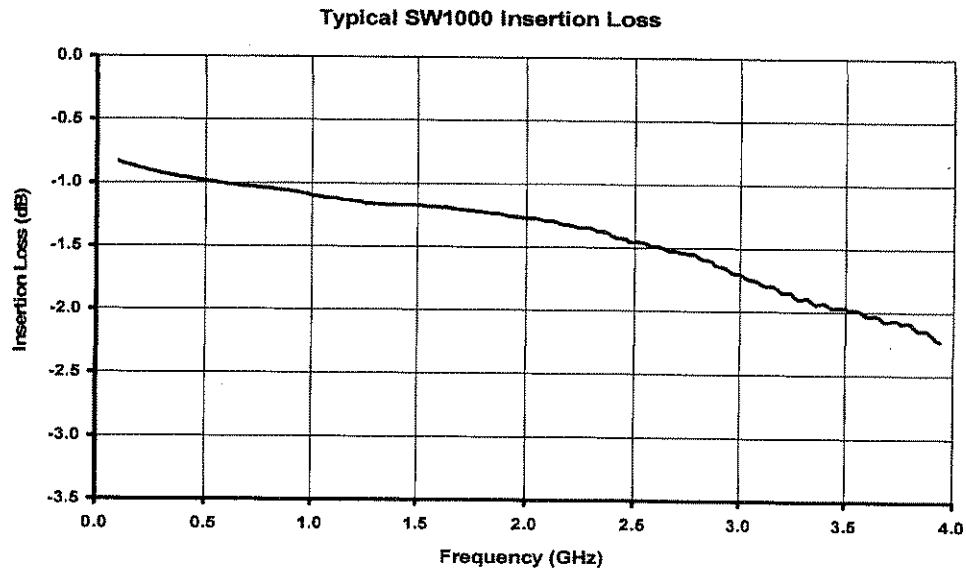
| Pin | Function | Pin | Function |
|-----|----------------|-----|----------|
| 1 | GROUND | 7 | GROUND |
| 2 | RF OUT 2 | 8 | RF OUT 1 |
| 3 | GROUND | 9 | GROUND |
| 4 | VDD | 10 | GROUND |
| 5 | SWITCH CONTROL | 11 | RF IN |
| 6 | VSS | 12 | GROUND |

Note: Bottom ground plate must be grounded for proper RF performance.

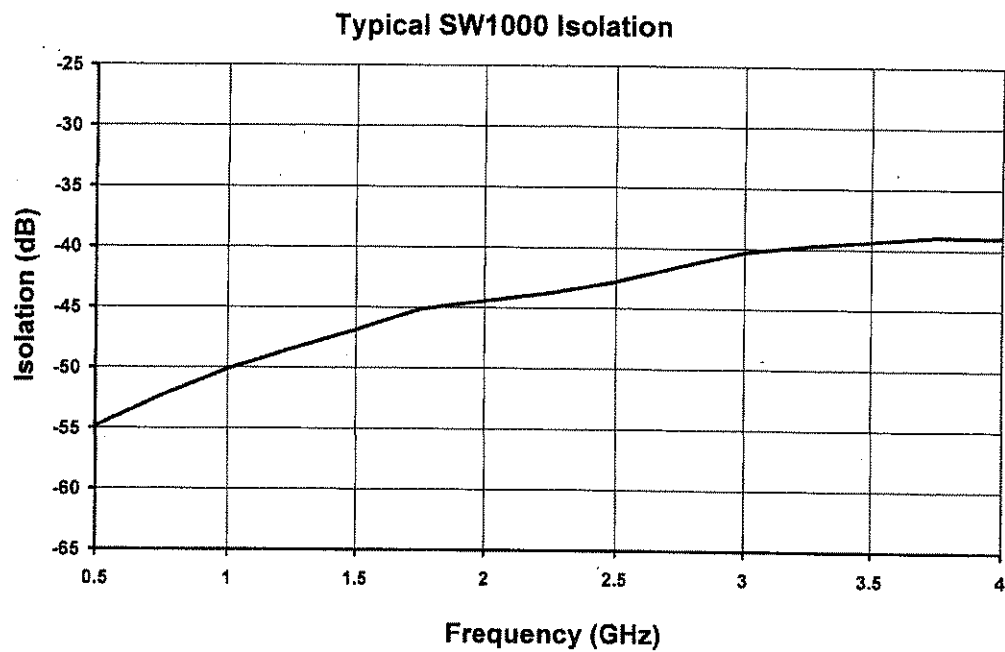
HRF-SW1000

PERFORMANCE CURVES

Insertion Loss

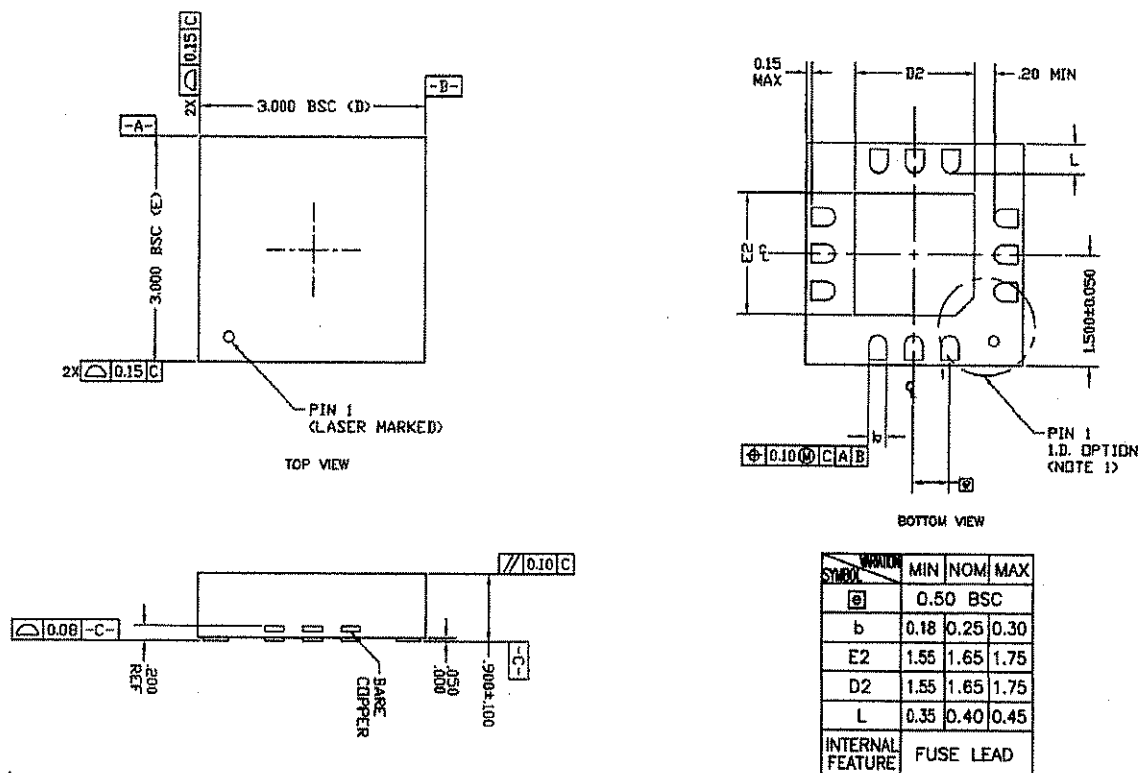


Isolation



HRF-SW1000

PACKAGE OUTLINE DRAWING



Notes

1. Pin 1 identifier can be a combination or a dot and/or chamfer.
2. Dimensions are in millimeters.

LEAD FINISH

The package leads are Nickel Palladium Gold (NiPdAu). The configuration being manufactured and delivered today is lead-free RoHS compliant. Compliant packages have half-etch leadframes and have date codes of 0300 or greater.

LEAD FREE QFN SURFACE MOUNT APPLICATION

Please see Application Note AN310 for assembly process recommendations. Application Notes can be found at our website: www.honeywell.com/microwave

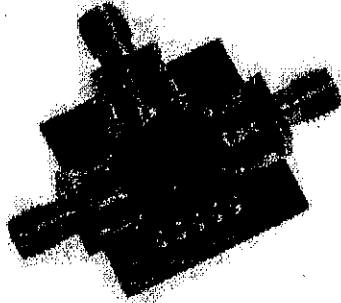
CIRCUIT APPLICATION INFORMATION

These attenuators require a DC reference to ground. They may not operate properly when AC coupled on both the RF input and output without a DC ground reference provided as part of the circuit. See Application Note AN311.

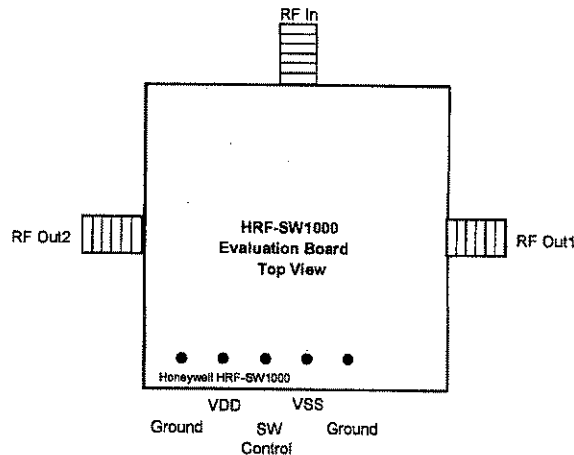
HRF-SW1000

EVALUATION CIRCUIT BOARD

Honeywell's evaluation board provides an easy to use method of evaluating the RF performance of our switch. Simply connect power; DC and RF signals to be measuring switch performance in less than 10 minutes.



HRF-SW1000 Evaluation Board



EVALUATION CIRCUIT BOARD LAYOUT DESIGN DETAILS

| Item | Description |
|----------------|--|
| PCB | Impedance Matched Multi-Layer FR4 |
| Switch | HRF-SW1000 RF Switch |
| Chip Capacitor | Panasonic Model ECU-E1C103KBQ Capacitor, .01uf 0402 10% 16V |
| RF Connector | Johnson Connectors Model 142-0701-801 SMA RF Coaxial Connector |
| DC Pin | Mil-Max Model 800-10-064-10-001 Header Pins |

ORDERING INFORMATION

| Ordering Number | Delivery Method | Units For Shipment |
|------------------|------------------|---------------------|
| HRF-SW1000-AU-TR | Tape & Reel | 2500 Units per Reel |
| HRF-SW1000-AU-T | Tape | < 2500 |
| HRF-SW1000-E | Evaluation Board | One Board Per Box |

FIND OUT MORE

For more information on Honeywell's Microwave Products visit us online at www.honeywell.com/microwave or contact us at 800-323-8295 (763-954-2474 internationally).

Honeywell reserves the right to make changes to improve reliability, function or design. Honeywell does not assume any liability arising out of the application or use of any product or circuit described herein; neither does it convey any license under its patent rights nor the rights of others.

Honeywell
12001 Highway 55
Plymouth, MN 55441
Tel: 800-323-8295
www.honeywell.com/microwave

Form #1000W
January 2007
©2007 Honeywell International Inc.

Honeywell

